

# A New Look at the Well-Formedness Constraint\*

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◇Partee: What I want to talk about today concerns not just semantics so much as the relation between semantics and syntax. Although the work that I have been doing and that I will talk about is mainly within the theory of Montague grammar, I think that some of these ideas are equally applicable to transformational grammar. Emmon and I both have been talking a lot about Montague grammar while we have been here. I don't want to make it seem as though we think transformational grammar is, in the past, all of no value. It is certainly true that much of the recent work in Montague grammar by linguists has drawn very heavily on past work in transformational grammar and many linguists are now formulating theories which try to use best parts of Montague's work together with best parts of transformational work. So the theory of transformational grammar, I think, should still be considered a very important part of the enterprise which now I call Montague grammar. The general topic within which this paper is a part is the topic of constraints on grammars. The goal of linguistic theory is to try to characterize what it is that makes human languages distinctive, how human languages are the actual human languages and what we think to be all of the possible human languages differ from other imaginable kinds of languages including the languages of computers or the languages that are invented by logicians. The class of human languages seems to have a lot of very particular properties and to characterize these is one of the important goals of linguistic theory. In general, the formulation of these properties comes in two parts: one being the very general form of a linguistic theory and the other part being formulation of certain universal constraints within such a theory.

Within the theory of transformational grammar, most of the constraints that have been studied are constraints on form of rules. There has been a lot of work on things like the A-over-A Constraint or the Coordinate Structure Constraint studied by Ross. I think Ross's dissertation was one of the first major works on the theory of constraints in grammar. I want to talk about a different kind of constraints which rises quite naturally within the Montague framework but which, I think, can also be applied in many cases to the transformational framework.

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\* Editor's note: This is the transcription of what Professor Partee presented for the Workshop on Semantics at the LRI Conference on Metatheoretical Constraints in Linguistics held at Seoul National University. Some questions and answers are included. The preliminary stage of the transcription was done by Miss Kyounghee Chang.

I'll talk about the constraint that I call the Well-Formedness Constraint. First, I want to say a little general word about the form of Montague grammar and the way in which it differs from the form of transformational grammar. The first thing on the handout is a scheme for the statement of syntactic rules in Montague grammar.

(1) Syntactic rules in Montague grammar:

If  $\alpha \in P_A$  and  $\beta \in P_B$ , then  $F_1(\alpha, \beta) \in P_C$

A Montague grammar tries to generate surface structures directly starting from smallest elements, that is, the lexical items and the rules all describe how to put smaller pieces together to form larger constituents. So that the very last rules that supply might be the rules that says if you have noun phrase and verb phrase you may put them together to form a sentence, whereas in the transformational grammar, in the phrase structure part you begin with the rule for expanding a sentence and work down to the lexical items at the end. And then, the transformations are coming afterwards and they are from the bottom to the top. So in a transformational grammar, you have first the phrase structure component which generates deep structure from the top to down, and that deep structure, in general, is not a pronounceable sentence of the language. In general, there must be some transformations applied before you reach surface structure which can be interpreted as an actual sentence of the language.

In a Montague grammar, on the other hand, you begin by describing the possible surface noun phrases of the language, possible surface verb phrases of the language, and then you put those together to form possible surface sentences of the language. There is no abstract level of deep structure. Everything is being put together from the bottom to the top to form a direct surface representation of the sentence. (Let me use the blackboard for a moment to illustrate that difference in one little case, the case of relative clauses for instance.) In a transformational grammar, the way relative clause structure is described is as follows: there is one phrase structure rule which might write as saying something like this. (Let me use the category *Nom* to represent a noun phrase without the determiner part.) But phrase structure rules might include the rule that says *Nom* can be rewritten as *Nom*+*Sentence*. And then there is a transformational rule that applies. You have a deep structure and say some point within it. It has a noun phrase which consists of a determiner and the *Nom* and this *Nom* is a noun plus a sentence. The *Nom* might be a simple noun like 'boy' and the sentence might be something like 'Mary loves the boy' or perhaps something with *Wh* morpheme or something. The phrase structure rules generate a sentence which contains a part like this, something like 'the boy Mary loves the boy'. Now, we know that that sequence of words in that order could never be pronounced as part of an English sentence. But there is no noun phrase of the form 'the boy Mary loves the boy'. So later, after all the phrase structure rules have applied, then the transformations apply starting with the bottom sentences and eventually here we may reach this constituent. The

relative clause rule will apply and we will change the subpart 'Mary loves the boy' into '[the boy] who Mary loves' or '[the boy] that Mary loves'. After the transformation applies, then we have a possible pronounceable well-formed English noun phrase.

In Montague grammar, on the other hand, we begin by generating a simple sentence like 'Mary loves him<sub>0</sub>' (Let me introduce one of the things that comes from Montague grammar something like a pronoun with subscript 'him<sub>0</sub>' which will be interpreted very much like a variable 'X' that the logician might use.) But ignoring the subscript, we can say we generate a simple sentence like 'Mary loves him'. And this by itself is certainly a possible sentence. If we generate that and we also have a simple noun like 'boy', then the rule in Montague grammar forming relative clauses, we will say that we can combine a simple nominal and a sentence to make a complex nominal and the statement of the syntactic rule for combining them will include within it the specification of what changes must be made to the sentence to make the result be a well-formed and pronounceable noun phrase. 'Boy who Mary loves' will be produced directly by a single rule which both puts these together and does the changes that are necessary within the sentence. So there is no stage at which it is claimed that any possible nominal of English has the form 'boy Mary loves the boy'. We just take a possible sentence and a possible noun and together directly produce something which is a possible common noun phrase or Nom constituent. If we have to know that this by itself is a Nom and this is a sentence and then we know that the result is again a Nom. So that the big difference in the form of the syntax is that every thing is built up directly. All is well-formed surface constituents of various categories without producing intermediate structures which are themselves not well-formed but which become well-formed by the application of transformations.

Now, the biggest constraint that Montague introduced on the relation between syntax and semantics (and this is really the central claim of Montague grammar in general) is that for each syntactic rule there must be a corresponding semantic interpretation rule which says explicitly how the meaning of the complex expression can be formed from the meanings of the parts. This is the constraint that is known as compositionality and it is the central constraint which is intrinsic to Montague grammar. Compositionality again is the principle that the meaning of a complex expression must be a function of the meanings of its parts. And the job of the grammar is to explain in each case what function, what meaning function, is associated with each syntactic combination function and this is reflected in the form of the grammar by the fact that for each syntactic rule like (1), there must be a particular corresponding semantic rule like (2).

(1) Syntactic rules in Montague grammar:

If  $\alpha \in P_A$  and  $\beta \in P_B$ , then  $F_i(\alpha, \beta) \in P_C$

(2) Corresponding semantic rule:

If  $\alpha$  is interpreted as  $\alpha'$ ,  $\beta$  as  $\beta'$ , then  $F_i(\alpha, \beta)$  is interpreted as  $G_k(\alpha', \beta')$ .

Let me read the syntactic rule for you to make the symbols clear. It says if  $\alpha$ , that is some expression in the language, English, is a member of the set of phrases of category A and  $\beta$  is a member of the set of phrases of category B, then some syntactic operation  $F_1$  applied to  $\alpha$  and  $\beta$ , will produce a phrase of category C. So in the relative clause example, for instance, we will be saying if  $\alpha$  is in the category of nominals and  $\beta$  is a well-formed expression in the category of sentences, then (let me call this)  $F_{\text{Relative clause}}$  applied to  $(\alpha, \beta)$  is again a member of the set of phrases of the category nominal, where to this description of this function, the relative clause function, this will say that what we do with  $\alpha$  and  $\beta$  is: we first write  $\alpha$  and then we write a changed form of  $\beta$ , which we call  $\beta'$ , and we must describe explicitly what you do with the original sentence to turn it into the corresponding relative clause. That part of it looks perhaps similar to a transformation. But the rule, the whole rule, combines both the effect of a phrase structure rule that puts the Nom and the sentence together and the transformational rule which changes the form of the sentence. So that the result comes out as in this case 'boy who Mary loves'. And the way we usually draw diagrams of sentence structure in Montague grammar, is to draw a tree which shows the order in which parts have been put together to form larger parts. So for each node of the tree instead of just writing a category label we write the whole resulting expression, although I could just as well, in this case, have written at this point that what we get from what we put these together is the function  $F_{\text{Rel}}$  applied to 'boy' and the other part. What appears at each node is the result of applying a particular syntactic function to the constituents that appear below it in the tree. So for each of the syntactic rules there must be an associated semantic rule and the right semantic rule is interpreted as if we say if I want about original expressions of  $\alpha$  if we've already interpreted that as  $\alpha'$  and the other expression  $\beta$  has already been interpreted as  $\beta'$ , then we have to state a particular rule for how the interpretation of the combined structure is to be determined as a function of the interpretation of the parts. So the semantic rule will always provide some semantic operation which I can call  $G_i$  and that I would  $C_k, C_k$  applied to the interpretations of the parts. So if we want to see how the interpretation of a whole sentence is derived, we start at the bottom in the lexicon which gives us interpretation of each lexical item for a complex sentence like 'Mary loves him'. We will already have built up its interpretation from the interpretation of its parts, then corresponding to the complex expression 'boy who Mary loves' we will have a particular semantic interpretation rule that will interpret that whole expression using as parts, the meanings of these parts below. In this case, 'boy' is interpreted as a simple predicate as something that picks out a certain set of objects, and the sentence 'Mary loves him', if we interpret this like a variable, this can also be interpreted as something which picks out a certain set of objects, the set of objects which Mary loves. The semantic interpretation of the combination is just like the conjunction of those two properties. This whole expression 'boy who Mary loves' will pick out the set

of all those things which are boys and which Mary loves.

◇Chungmin Lee: (Recapitulation in Korean.)

◇Kee-dong Lee: Suppose the bottom line consists of string of words like 'boy Mary sings the song', what would happen?

◇Partee: That question can be answered both in transformational grammar and in Montague grammar. It's a very interesting question. I want to answer for both because I think it's a respect in which perhaps the Montague grammar is a little simpler. In transformational grammar, if the base rules are context-free rules, which is usually assumed, then one of the things that we produce would be just what you suggest. We would have 'the boy' and then the sentence might be 'Mary sings a song'. Because these rules are context-free so any sentence at all might be generated in this position. Transformational grammar needs the theory of filters to prevent such strings from reaching the surface level. In the theory of *Aspects*, Chomsky used the sentence boundary marks to do the filtering because if the relative clause rule would be unable to apply to change anything into Wh-word or to delete any part until the sentence boundaries would remain and Chomsky suggested that anytime you get to the end of the transformations and then still boundaries are there, then you discard that deep structure. In general in transformational grammar, there are many base structures which do not correspond to any surface structure and the theory of filters of some kind has to be used to rule them out.

In Montague grammar, if we write the rule more carefully, I wrote it in just a very proximate way, at first we can say something like this: if  $\alpha$  is in the class of nominals and  $\beta$  is in the set of sentences, then we can add some conditions, some structural conditions in this case, we can say, and further more  $\beta$  contains an occurrence of one of this special kind of pronouns  $he_i$ , then, the relative operation applies to  $\alpha$  and  $\beta$  is a well-formed nominal and if there is no occurrence of a word of the sort to relativize on, then there will simply be no complex noun produced, as only those sentences which have something that can be relativized on would enter in the relative clause rule. If another variant is to be believed that there are Wh-words like 'who' generated directly in the embedded sentences, in that case, you could say and  $\beta$  contains an occurrence of Wh-word, then this rule can apply and will produce a well-formed nominal. But in effect, if there are any restrictions on the kinds of things that can combine together they should be stated right at the level of that rule, so that nothing is produced which needs to be filtered out at some later stage.

◇Kee-dong Lee: Without that condition your rule (1) might regard nominal like 'the boy Mary sings the song' as acceptable.

◇Partee: In fact, Montague himself generated relative clauses of a style that occurs mostly in mathematical literature, things like 'boy such that Mary loves him' instead of 'boy who Mary loves' and it is a matter of debate whether with this kind of relative clause whether it's all right or not all right to say something like 'boy such that Mary

sings a song'. I think most mathematicians will claim that it is all right. It's something which would never occur because it adds no useful information, that is, if you said it was well-formed you could still explain why it's odd to say 'boy such that Mary is singing a song' because either if Mary is singing a song semantically that will pick out the class of all boys or if Mary is not singing a song then semantically that will pick out the class of no boys, the empty set. And there are much simpler ways of picking out these two classes. So that would be a very account of pointless way of expressing whatever was he wanted to express. So 'boy such that Mary sings a song', you can either design the theory to make that syntically ill-formed or you can design the theory to make that syntactically well-formed with an explanation from a theory of communication about why no one would ever choose to say it in any normal situation.

◇Kiyong Lee: Suppose you have two variables of the same index, for example, 'he<sub>0</sub> washes himself<sub>0</sub>' and because of that statement in your relative clause you can't have a sentence like 'boy he who<sub>0</sub> washes'.

◇Partee: No, it's not. This would be a good restriction for explaining what Postal called 'Cross-Over Constraint'. In general, this point is probably a little bit complicated but when we describe the  $F_{Rel}$  function, it will say that if there are several occurrences of he<sub>i</sub> or him<sub>i</sub>, then it is always the first one that becomes the relative pronoun. If there two occurrences of the same he<sub>i</sub> in a simple sentence, one would have become a reflexive, 'he<sub>i</sub> loves himself<sub>i</sub>'. And it would always be the first one that would be affected. We could get 'a boy who loves himself'. But we could never relativize on the second one and get 'boy who he loves', for that *he* is understood as the same person as the boy. That's a small detail perhaps. But, it's one where the theory, I think, also makes the correct prediction.

Let me state the Well-Formedness Constraint. That's the constraint, that says in these rules that are combining expressions of various categories to produce new expressions of various categories. Each of the input expressions as well as the output expressions must be well-formed expressions of the language that's being described. I've been kind of using that implicitly as I've been describing the examples. But this is the principle that says you cannot use the various abstract underlying representations which themselves need to be transformed before they can become well-formed. You must, in fact, build good surface phrases from good surface phrases. Not just a category sentence, but this is assumed that we can talk about well-formed nominals, well-formed noun phrases, well-formed verb phrases, etc. and for each category, we need to have a notion of what it is to be a well-formed expression of that category. And all of the rules must involve only well-formed expressions of the respective categories. For some categories, we have pretty clear intuitions. I think linguists are accustomed to working with the category of sentences and the whole division of grammatical and ungrammatical has most often been applied just to the category sentence. I think, at least in English, there are clear intuitions about

well-formed noun phrases as well, because the noun phrases often occur in isolation, for instance, as the answer to a question for something of that sort.

For some categories such as, for instance, a category of transitive verb phrase which includes not only items like 'kill' or 'love' but also might be argued to include the complex items like 'persuade to leave'. I won't go into the argument here but I think in many ways the best kind of system is one which treats 'persuade to leave' as a complex transitive verb which takes 'John', for instance, as an object. The syntactic rule that puts this verb to get this transitive verb phrase together with this object has to insert the object right after the first lexical verb of the phrase. 'Persuade John to leave' is analyzed in this system as consisting of a transitive verb phrase 'persuade to leave' plus an object 'John'. If we ask about this notion of well-formed transitive verb phrase, the intuitions are not too clear because 'persuade to leave' does not normally occur as a unit in isolation. So the notion of well-formed expression is a somewhat abstract notion. It cannot simply be taken to mean something that occurs as a string of consecutive words in some surface English sentence and that would be both too weak and too strong.

But, boring that complication that occur from how we depend on the concept of well-formedness for various categories other than sentence. We can still say that however we make the decisions about the particular categories, we can still require the grammar as a whole to meet that condition. If we do have the category of transitive verb phrase then only the well-formed transitive verb phrases should occur in the derivation of more complex structures. Now, Montague himself almost had this constraint as part of his theory, but not exactly. In his original theory, he suggested that one used the syntactic rules to define a language that was not exactly English, but rather something, which we might call English'. A language which should be completely as unambiguous language including at least the kind of tree structures that I have shown before that would assign the different tree structures to genuinely ambiguous sentences. But, he also allowed the language might include a certain abstract markers. In some of his written works, he included fancy parentheses of various sorts to mark out certain kinds of positions in a string for later rules would apply in a particular way. Very much like the abstract morphemes that linguists have sometimes used like a Q morpheme for questions and things that are not really a part of surface language. Montague himself allowed that the language that was described by the syntactic rules would not be exactly the surface language. And there would be a component at the end of the grammar that would map the strings in the disambiguated language into the surface strings of the actual language. In order to make the constraint stronger, I would like to suggest that we allow the kind of derivation trees that I've shown before as part of what makes the language unambiguous. But don't allow any of these abstract markers or other special symbols. Use only the morphemes and words of the sentence of the language itself plus the tree structure which is showing the derivation. If we ignore the tree, because that's the kind automatically

generated by the grammar, the stronger version of the Well-Formedness Constraint requires that we really just operate on surface strings of the language.

◇Kee-dong Lee: The category sentence, must be a declarative sentence. 'Boy who hit the boy?' cannot be formed into the relative clause.

◇Partee: That's true. There are independent reasons for wanting to distinguish the declarative sentences from questions because semantically they were very different as well. Part of the constraint about the relation between syntax and semantics requires that each syntactic category corresponds to semantic category. There are both syntactic and semantic reasons to want to distinguish the category of sentence meaning of declarative sentence from the category of question.

◇Kee-dong Lee: What about the noun and relative clause which are discontinuous like 'A girl came in who carried an umbrella'?

◇Partee: To generate something like 'A girl came in who carried an umbrella', in this kind of a case, a rule like the transformational rule of relative clause extraposition would be perfectly consistent with Montague grammar. I can generate this from 'A girl who carried an umbrella came in'. The part of what I meant, when I said much of the work in Montague grammar is building on work in transformational grammar, is that any transformational rule which always produces grammatical sentences from grammatical sentences and which does not change the meaning in any way can be written in almost exactly its transformational form as a rule of Montague grammar. In this case, the rule would say something like 'if  $\alpha$  is a sentence and  $\alpha$  has the form' and now I write something that in effect just talks about it consisting of a noun phrase that contains a relative clause somewhere within it, then extraposition function  $F_{\text{Extra}}$  applied to  $\alpha$ , is also a sentence. Here, the content of the syntactic operation would be essentially identical to the content of the transformation of relative clause extraposition and the semantic rule, in this case, would say that if  $\alpha$  is interpreted as  $\alpha'$  then the result of applying this operation is also interpreted as  $\alpha'$ . That's the semantic identity function because it doesn't make any change at all.

◇Kee-dong Lee: Suppose that the two sentences are not identical in meaning. What would you do?

◇Partee: I don't know what I will do in this particular case because I don't know what the difference in meaning would be. But for the general case, there are two kinds of situations. Suppose we have some traditional transformation and it operates on a certain class of input sentences and turns them into their certain derived form and the meaning changes. If the meaning changes in a way which is completely consistent and can be stated in a direct way as a certain function of the interpretation of the first sentence, then I can have such a rule in the Montague grammar and the associated semantic rule will state the change in meaning. As a simple illustration of that, for instance, in *Syntactic Structures* Chomsky had a negative transformation. He didn't generate

'not' in the deep structure, but he rather had a rule which maps a sentence into a negative sentence. If we ignore all the complicated cases of quantifiers, just think about simple negative sentences like 'John loves Mary' transformed into 'John does not love Mary', then we could have that as a rule in the Montague grammar, and in that case, we could say the original sentence was interpreted as  $\alpha'$ , the transformed. The syntactic operation  $F_{Neg}(\alpha)$  would correspond to the semantic operation of just putting negation together with the meaning of  $\alpha'$ . Transformation which changes meaning can be expressed as a rule of Montague grammar, if the change in meaning is uniform. But if the change in meaning is different, for different examples, and is not expressible as a uniform change of meaning, then there is no way to put an exact corresponding rule into the Montague grammar. And there we have to have a different analysis in the Montague grammar.

◇ Chungmin Lee: (Recapitulation in Korean.)

◇ Kiyong Lee: Defining exactly the notion of well-formedness you raised the question concerning whether such expression as 'persuade to leave' is well-formed or not. But suppose you are working within the EFL or Universal Grammar where the first line starts out with an open sentence having  $he_0$ ,  $him_0$ , then you could define that notion at the level of sentence. Your well-formedness would be defined not at the word level but at the level of sentence. If you could say that 'persuade to leave' would be supplied all the subject and object and so you could have ' $he_0$  persuaded  $him_1$  to leave', then you would not have any difficulty of whether your notion of well-formedness is explicit or not.

◇ Partee: I think that question, in this case, is not so much how to make the notion of well-formedness explicit because once you adopt the constraint as a general constraint, then your grammar in effect, makes the notion explicit. The problem is more the question of whether it's an empirical notion, if I write a grammar in which I say 'persuade to leave' is a well-formed member of the class of transitive verb phrases, and you write the grammar in which you say 'No, 'persuade John' is a well-formed member of some other category, and 'persuade to leave' is not a well-formed member of the class of transitive verb phrases', then the question is what empirical evidence will let us choose between those two descriptions. In the case of category sentence, we appeal to the intuitions of native speakers and it is well known that there are often many disagreements. I think the notion of dividing the sentences into grammatical and ungrammatical has been recognized to be a very complex question, because the only direct intuitions that we have even about the level of sentences is that some of them seem odd or funny or something is wrong with them. And some of them seem perfectly normal. And to try to decide which kinds of oddness or deviance should be called syntactic ill-formedness and which kinds of oddness or deviance should be explained in some other way becomes in large part a theoretical question. How do you draw the line between which things are syntactically well-formed and which things are syntactically bad? Which things are syntactically OK

but semantically bad, depends in part on what kind of theory of syntax and semantics you have. So the situation is no worse here than any scientific theory, I think. You have a whole family of important primitive notions and you can relate them to empirical evidence at many points. But almost never can you take one central notion and relate it directly to a certain empirical testable kind of phenomena.

◇Bach: I just want to add to what you are saying the following observation. We do have very clear intuitions about ungrammaticality of certain examples right now. For example, I have a very clear intuition that 'Q John loves Mary' is not a well-formed English sentence and the kind of abstract marker or that 'John loves (/Mary)/', those are not well-formed English sentences either. It seems to me that there are two kinds of cases to consider: one is the case of 'persuade to leave' for we have actual sequence of morphemes in the language, those problematic cases, but the Well-Formedness Constraint, I think, for the other cases written in your grammar really does give us places where we are quite sure that there aren't English sentences that start with Q and so on except in linguistics books.

◇Partee: I think if I go on with some of the examples, it may be clear because in those cases I will be talking about competing analyses, for one analysis violates the well-formedness constraint and the different analysis conforms to the Well-Formedness Constraint and in those cases the ill-formedness of the bad examples, I think, is very clear and very uncontroversial.

◇Chungmin Lee: (Recapitulation in Korean.) Well, isn't the abstract morpheme Q a kind of theoretical construct rather than a surface form in English?

◇Partee: That's why it's not allowed in any grammar which is trying to meet the Well-Formedness Constraint. As long as we all agree the Q is not a part of any surface sentence of English, then it cannot appear as part of the derivation of any surface sentence of English in a grammar which meets the Well-Formedness Constraint. So that's why it's immediately evident that this is a very strong constraint. If you apply it to transformational grammar it really can have a big effect there, too, because it would mean trying to do transformational grammar without any of these abstract markers like 'Q' for question. Let me mention one other area in which I think the Well-Formedness Constraint could potentially offer some help to the goal of explanatory adequacy in linguistic theory as well and that has to do with the task that the child faces in trying to figure out the grammar of the language that he is learning. If you consider all the different kinds of transformational analyses that have been suggested in constructions for people have disagreed about the right analysis and imagine a child as a little linguist and although that's presumably not quite children work. If children really have to choose among all those different analyses with also possible abstract morphemes and also two different possible underlying forms which differ in arbitrary ways from surface forms that they really hear, then the child's problem looks extremely difficult. But if the child could be imagined to proceed by only considering

an analysis which use parts which he actually hears as well-formed surface pieces of the language, then that could make it much easier for the child to learn the language because although this constraint does not in any way effect the number of possible languages that can generated by a given theory. It's very strongly constraint that the number of possible grammars for any one language to the number of possible different grammars that could be counting for any one set of surface forms. You could imagine the child is the early stages learning the simple nouns, the simple verbs, the simple adjectives and being able to use those in a more direct way to determine the rules that produce the complex sentences that he hears later.

◇In-Seek Yang: (Garbled.)

◇Partee: The first question was 'Is there a directionality implicit in Montague grammar from syntax to semantics?' and the answer is very definitely 'Yes,' because the semantic interpretation, although I have not said very much about it here, involves relating the English sentences to their truth conditions as the conditions under which they would be true in any possible situation, and those truth conditions are formulated in the very general kind of ways so that there are many possible meanings for which there is no English sentence at all. The semantic interpretation in this kind of system is really a kind of non-linguistic object, something like the class of possible situations in which the sentence is true or the interpretation of something like *boy* is the set of all boys that there are or the set of all possible boys that there might be. So there is a very strong directionality built into the system where we construct the syntactic object and then interpret them by the semantic rules or you could think of it equivalently, though I think it has the same directionality, as constructing always a set of pairs, a syntactic expression  $\alpha$  and a semantic interpretation  $\alpha'$ , combines with another syntactic expression  $\beta$ , combine with the interpretation  $\beta'$ , to produce a complex syntactic expression, the thing we form by applying the syntaction  $F$  to  $\alpha$  and  $\beta$  together with the interpretation which will be  $G_k(\alpha', \beta')$ . But still the semantic interpretations are always defined relative to particular syntactic constructions. The challenge was how can we ever explain the fact that many syntactically ill-formed sentences are semantically interpretable. The example was 'I John love' which is not grammatical English and yet I think it could safely assumed that any English speaker hearing this would assumed that it means the same thing as 'I love John'. It's certainly true that we can hear syntactically ill-formed sentences and sometimes assign an interpretation to them. But I reclaim we don't do it by the normal rules of the grammar. I reclaim that what goes on here is very similar or could be very similar to what happens if you give somebody say one of these games for you have little cubes with words on them and shake out cubes and then the job is to make a sentence from them. If we shake out some cubes and they say something like: You have a cube that has a *boy*, a cube that has a *bites* and a cube that has a *dog* and maybe a couple of cubes that have *the* on them. Your hand has the

five words in a random sequence. Any normal person would be able to put these together to make some kind of interpretable sentence, either 'The dog bites the boy' or 'The boy bites the dog'. Probably most people would first try 'The dog bites the boy', but that's not by linguistic reason; that's just probably by what we know about dogs and boys, and that ability to take a scrambled or syntactically ill-formed words with no syntax at all and to assign the meaning to them, probably, is the combination of two abilities: one is the ability to unscramble the sentences and arrange them in some grammatical form and the second is the ability that is represented by the grammar which assigns meanings to the well-formed structures. I think, any time you interpret an ill-formed sentence, it's probably done by means of first constructing some similar well-formed sentence and then ordinary rules of the grammar can interpret that.

Now, that's a conjecture on my part. I don't know experimental evidence for it. But it is something for which there could be experimental evidence. I know some related evidence which involves flashing sentences on a screen one word at a time very very fast where you don't really have time to consciously see the words one at a time and in cases where some of the words are put in the wrong order like 'boy the walk to the store'. Subjects are not consciously aware of having seen anything wrong but it takes them slightly longer to respond to some kind of test question about the sentence.

◇Question: (Garbled.)

◇Partee: Not necessarily one-one because they may be synonyms in the language. But I do assume that for each  $\alpha$  there is exactly one  $\alpha'$ . If there are pairs of words like Korean *paē* (배), I think which can be a pear or a boat, is that the right example? I need to put two different *paes*. I got this example from an article by Lee Kiyong. I have to have *paē<sub>1</sub>*, *paē<sub>2</sub>*, and each one of those would have its own interpretation.

◇Question: (Garbled.)

◇Partee: No. The relation between the particular operations is not one-one. It can be many to many because if you look at (1) again, for each particular syntactic rule has two important parts: one is a specification of the categories involved and the other is the  $F_i$  operation and for instance many rules involve an  $F_i$  which is simple concatenation. The rule puts a verb together with its object. The rule puts the subject together with the verb. So there are many rules where  $F_i$  might be just the concatenation operation. But, if they apply to different categories, those different rules may have different semantic interpretations. For each syntactic rule, there must be a single semantic rule, exactly one, but the particular syntactic operations and semantic operations that are involved do not have the correspondence each other.

◇Abasolo: What do they have in common, F and G functions of rules? If you say the operations would be different, can you have an example?

◇Partee: For instance, there is a rule that says if  $\alpha$  is in the category of sentence and  $\beta$  is also in the category of sentence, then  $F_{\text{Conjunction}}(\alpha, \beta)$  is in the category of

sentence, where, I'll spell it out explicitly,  $F_{\text{Conjunction}}(\alpha, \beta)$  is  $\alpha$  followed by the word *and* and followed by  $\beta$ . The semantic interpretation rule in this case, let me call this rule (17), just to give an arbitrary number, but just make it clear by the rule, I mean the whole thing, the specification of categories and the operation. So for semantic rule (17), I will say if  $\alpha$  is a sentence and  $\beta$  is a sentence and  $\alpha$  is interpreted as  $\alpha'$  and  $\beta$  is interpreted as  $\beta'$ , then  $F_{\text{Conjunction}}(\alpha, \beta)$  is interpreted as G, let me call this  $G_{\text{Sentence Conjunction}}(\alpha', \beta')$ , where that is in particular just the logical conjunction sign placed between  $\alpha'$  and  $\beta'$ .

Now, there is also a syntactic rule for verb phrase conjunction. I won't write the whole rule here. But it looks just like this except that it says  $\alpha$  is a verb phrase and  $\beta$  is a verb phrase. The very same syntactic operation produces, in this case, verb phrase where you can put *and* between sentences and you can put *and* between verb phrases. In fact, there is a conjunction rule for almost every category of the language. But the logical 'and' is only defined for sentences. When I write a semantic rule (18), the one that's going over the verb phrase conjunction, I'm going to have to write something different. I will write it but not interpret it. Just you can see it looks different. We would say something that forms a complex predicate which is true of individual just in case both verb phrases are true of that individual. This is the  $G_{\text{VP Conjunction}}$ . In this case, there are two different rules, rule (17) and rule (18). They use the same F but they use different Gs.

There is a semantic rule that goes with this syntactic rule. Another semantic rule goes with the other syntactic rule. There is one-one correspondence between the rules looked at as whole rules but there's not one-one correspondence between the operations that are involved in both rules.

◇Abasolo: Are there only logical operations possible? Or are there semantic operations beyond them?

◇Partee: The semantic operations are in effect logical operations. But I don't think it's true of natural languages that there is any semantic significance, for instance, to concatenation. I mean if you think what the syntactic operations are like, for instance, moving something to the beginning of the sentence, many rules make use of moving things to one end of sentence or another. There is no particular semantic unity to those rules. There may be some kinds of generalizations and if so, I would certainly want to find them. In fact, in one of my other papers, I suggested some subgeneralizations for families of syntactic operations and families of semantic operations. This thing about conjunction could probably be almost universal. Probably, almost every language will have a kind of conjunction that will apply many categories and the semantic result will probably be quite uniform. In fact, there is some recent work both by Gerald Gazdar who is mentioned on the end of my handout and by Ed Keenan which suggests a way of finding a single universal interpretation for conjunction across all the categories. Certainly, if there are connections between the F operations and G operations we want to find them.

But I think the thing we can be sure of now is that there are strong correspondences when you look at the whole rules.

◇Kiyong Lee: (Garbled.)

◇Partee: Yes, that's right. Lee Kiyong reminds me. I'm not being precise. The real semantic interpretation, as I said, involves these non-linguistic objects like truth conditions and sets of individuals. What I have shown here is not the real semantic interpretation but just translation into a certain kind of logical language which itself can be semantically interpreted in terms of truth conditions and sets of individuals and that sort.

◇Question: (From the floor.)

◇Partee: That's right. Without the new work of Gazdar and Keenan, we could not write a rule that says something like A rewrites as A and A for every category A. And it would be nice to be able to write a general schema of that sort. With the new work by Gazdar and Keenan, I think this is possible. Both of them have made use of the general notions of Boolean algebra and the notion of intersection of sets. I can't go into the details here, but I can refer you to the papers of Gazdar that I mentioned in the end of the handout. He does have a general scheme that would give a uniform, just  $G_{\text{Conjunction}}$  that would be the interpretation for all of the different categories of  $F_{\text{Conjunction}}$ . In that case, this would be a direct correspondence between a particular syntactic operation and a particular semantic operation.

◇Question: (Garbled.)

◇Partee: No. With their system, it's a single semantic rule that works for every category and I can put a variable here. If  $\alpha$  is anything, well, maybe not quite anything, but all of the major categories, then the result of conjoining them will be of same category and the single conjunction which involves something that is just a slightly more complicated analogue of the Boolean set intersection operation which means, that wasn't such a good example to illustrate, but non-correspondence of syntactic and semantic operation. I think I had better try to talk about the other examples on the handout, or never get to them. Though all of the questions have been important ones I'm glad to have chance to clarify the theory a little bit.

Most of these, I think perhaps all of these examples are ones which can apply equally well to transformational grammar and to Montague grammar. When they are looked at from the point of Montague grammar, they show a nice correlation between the syntax and semantics, but also within the transformational grammar, they suggest the syntax could be made much more constrained by something like the Well-Formedness Constraint. The first example concerns adjectives and the derivation of adjectives from relative clauses. (3) shows a traditional transformational grammar analysis of adjectives that come in prenominal position.

(3) man who is unhappy → unhappy man

'Unhappy man' is derived by transformation, perhaps by series of two transformations

from 'man who is unhappy'. There is a transformation often called Whiz-deletion and then a transformation of adjective preposing. And it was generally argued in transformational grammar, that all prenominal adjectives should be derived from relative clauses because otherwise they would complicate the grammar to have to introduce adjectives in two different positions in deep structure, adjectives in predicate position after 'be' and also adjectives before nouns. So to simplify the grammar, it was suggested that all the prenominal adjectives should come from relative clauses. There is also some independent evidence for that since we get expressions like 'men working on the street', where it's not just an adjective but the same Whiz deletion rule seems to apply to participles, to prepositional phrases and to many other kinds of constructions.

It was some early critics of transformational grammar pointed out that this led to some cases where the underlying form had to be ungrammatical.

(4) \*professor who is former → former professor

(4), for instance, 'former professor' if we take an adjective like 'former', if we try to derive that form 'professor who is former', that is an impossible relative clause, You can't use the adjective 'former' in predicate position. You cannot say 'President Ford is former' though we can talk about 'Gerald Ford is the former president'. If all adjectives ought to be derived from relative clauses, then in some cases we will be violating the Well-Formedness Constraint. We'll be generating an ungrammatical noun phrase and then by transformation turning it into a grammatical noun phrase. Within transformational grammar, they were examples of that sort that led to the introduction of some kinds of rule features and Lakoff was one of the people who worked on the theory of exceptions, minor rules, major rules and marking certain items as obligatorily undergoing certain rules and marking certain other items as obligatorily not undergoing certain rules. So 'former' would have to be marked as obligatorily preposed and if you generate the simple sentence like 'Ford is former' you need some kind of filtering device again to make sure that that does not reach the surface. If you generate 'Gerald Ford is former' something about the feature of obligatory preposing must guarantee you end up filtering that sentence out at the level of surface structure. But, you have to generate it in the deep structure to be the source of things like 'the former president'.

As long as that was viewed as just a syntactic problem, linguists do not take it too seriously. I mean it seems not so surprising that some items are exceptional. It means that we tried to make the rule as nice as possible but always there seem to be some exceptions. In this case, it was noticed independently by logicians that the adjectives which cannot occur in predicate position, all have a certain semantic property in common. That's illustrated by the little argument showing in (5).

(5) John is a good doctor.

John is a father.

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John is a good father. (invalid)

Let me do one like only with 'former'; if I say that 'Ford is a former president and Ford is a skier' it certainly does not follow from that 'Ford is a former skier'. It might happen, you might want to say, 'He is a former skier and also a present skier'. But in general, you can't make inferences of this sort with the adjectives like 'former' and if you take any of the adjectives of the sort that cannot occur in a predicate position like 'temporary', 'He is a temporary salesman', for instance. If I say, 'Mary is a temporary salesperson and Mary is a mother', it doesn't follow that 'Mary is a temporary mother', for instance. And 'old<sub>1</sub>', by that I mean like 'my old friend', in the sense in which he is my old friend but he may be very young as an ordinary person. 'Old friend' in the sense he has been my friend for a long time, if he is my old friend and he is my teacher, he may not be my old teacher. I may have had him as teacher for only a very short time. Or 'beautiful<sub>1</sub>', I mean as in 'a beautiful dancer' like 'someone who dances beautifully'. If she is a beautiful dancer and she is a skier, she may be a terribly ungraceful awful skier, and not be a beautiful skier at all. That corresponds with what happens in predicate position, if I try to say 'My friend is old', I cannot get the interpretation where I mean 'He has been my friend for a long time', and that only can mean he is in advanced age or something of that sort.

This contrasts with the ordinary adjectives. Say we take something like 'bold'. If I say 'Ford is a bold ex-president and Ford is a skier', then we can validly conclude that 'Ford is a bold skier', or if 'John is a blond violinist and John is a physicist', then 'John is a blond physicist'. With the ordinary adjectives, this inference pattern is perfectly valid. But with these adjectives that cannot occur in predicate position, the inference form is not valid. There is a very clear semantic difference between the adjectives that can occur in predicate position and the adjectives that cannot occur in predicate position. That means semantically we want to distinguish those two classes of adjectives. One kind like 'former' should be generated directly in combination with nouns. Since they don't have a meaning by themselves, they only have their semantics, in a sense, a kind of meaning that demands a noun meaning to combine with. You can't classify individuals as 'former' and take all the things in the world and try to say which of them have the property of 'being former'. That makes no sense. You can talk about 'former presidents', 'former professors', 'former skiers'. The meaning of the adjectives requires the meaning of noun to combine with to produce a kind of property. We look at (6), that is the Montague grammar rule, for treating these adjectives I use CN which is Montague's name for the category of common noun phrases.

(6) If  $\alpha \in P_{CN/CN}$  and  $\beta \in P_{CN}$ , then  $\alpha\beta \in P_{CN}$

It's the same as what I was calling Nom in the earlier examples and the category that I write CN/CN, that means the category of things that combine with the common noun to make a new common noun phrase. So 'former' combines with 'professor' to make the new common noun phrase 'former professor'. If we want to write this in transformational terms,

it would just mean adding a new phrase structure rule that says something like Nom can go to adjective, I want to give this class of adjectives a special name. What shall I call them? Attributive adjective is a name that sometimes is given in the literature and Nom can rewrite as attributive adjective plus another Nom. This insight could be added to transformational grammar where it would mean there should be two sources for adjectives. The attributive adjectives should always be generated directly in phrase structure in combination with a noun that modifies. For the predicate adjectives there are two possible solutions: One is to keep the old transformational rule of relative clause reduction because it's semantically and syntactically all right for that class of adjectives. The other way would be to introduce all adjectives in prenominal position and the plain simple adjectives also can be introduced in predicate position. A lot of that depends on how much evidence there still is for relative clause reduction transformation, once we realize that we do want to generate some adjectives directly in the phrase structure anyway.

◇Bach: I just want to say or ask, isn't it the case that there're some predicate adjectives that can't appear prenominal?

◇Partee: That's a good point, too. Yes. Some adjectives like 'asleep' and 'alive' can only appear in predicate position and cannot appear in prenominal position. But I'm not sure how that fact affects the choice of derivations because they appear to be exceptional either way. We have to account for the fact that both simple adjectives, let me call them predicate adjectives, both simple predicative adjectives and these attributive adjectives can occur in the surface in a position before a noun. We've argued that attributive ones should be generated directly. The Well-Formedness Constraint and compositionality constraint both forces to the same conclusion, which is the nice fact that I'm trying to emphasize because it shows how semantic compositionality constraint and the syntactic Well-Formedness Constraint seem to reinforce each other. But that still is open: the question of how to treat the predicate adjectives when they occur before the noun and the fact that some of them cannot. My suggestion is to put adjectives into three classes syntactically: the ones which can occur only in the attributive position, the ones that can occur only in the predicate position and ones that can occur in both positions. What will be nice would be to discover some semantic peculiarity of these. That would explain the reason why they occur only in predicate position. But for the moment, if I would make three classes of adjectives, I don't know any independent reason why these should be acting differently.

◇Question: (Garbled.)

◇Partee: That I think is a purely syntactic question that, I think, has been fairly well handled by an analysis that says we are doing relative clause reduction in analysis. If we have a noun and then we have who or which, is or are and then something like an adjective phrase which might be a simple adjective or in your case something like 'important to us'. The syntactic generalization about the preposing is that the adjective phrase must end with the head adjective. So if we have something like 'very important',

'extremely important', that can prepose even though two more than one word. But something like 'important to us' cannot prepose because the adjective is not at the end. As far as I know, that's a purely syntactic fact that has no particular semantic correlation. And in those cases, it is perfectly all right just to do the Whiz deletion and leave the adjective phrase sitting to the right of the noun as in 'those books important to us' or something like that.

◇Question: (Garbled.)

◇Partee: I don't understand, because 'important to us' is just semantically interpretable as 'important'.

◇Question: (Garbled.)

◇Partee: What comes out in the form 'the important to us books, that's not intrinsically uninterpretable. I think there are many languages which allow just this kind of construction. Doesn't German allow? But in many languages you get things which look just like this. I don't understand the claim that there is any intrinsic difficulty in interpreting this semantically. This particular string is not easily interpretable because it's not syntactically well-formed, I think.

◇Question: (Garbled.)

◇Partee: Yes. I think that's a matter of lexicalization, that is, sometimes phrases become so common like 'easy-to-cleaner' 'easy to clean oven' or something, things that get used in advertizing a lot. You can look at the advertizers as the corrupters of language or as the ones who advance the linguistic change faster. But in any case that transformation of certain phrases into new lexical items, I think, is what's going on in that kind of case. And the hyphens could be regarded as a device for showing this is a noun to be regarded as a single word. If it's a single word, it's certainly an adjective and then you have the ordinary rule saying, 'Yes, it is an adjective'. The adjective is at the end of its own phrase, in fact, as one word adjective, so then you can prepose.

◇Kee-dong Lee: Your characterization of these adjectives, 'former', 'temporary', 'good', and 'beautiful', is interesting to me and just I want to call your attention to Bolinger's characterization of these adjectives.

◇Partee: He calls them referent modifying versus reference modifying. He is one of the first linguists to notice this idea and was independently noticed by several philosophers. Dwight Bolinger in the journal *Lingua*, I think, had an article about adjectives and he called them attributive and predicative and characterized them semantically as referent and modifying—these are the ones which directly describe individual and reference modifying, that is, somehow changing the meanings of referring to the whole class of things. The philosophers who worked on it include Terence Parkins, Hans Kamp and Montague himself. And it was quite interesting that in the logicians' works what they noticed was the inference pattern and in fact the inference pattern worked for some adjectives not for others. What the linguists start with is noticing distributional differences and this is one

of the prettiest examples of a case where those two approaches turn out to converge on the theory that we really need to put adjectives into two categories both syntactically and semantically. I think I have a reference. I should have a reference to the dissertation of Muffy Siegel. She wrote a dissertation on adjectives and she also has a short article on Russian adjectives in the book that I edited, called *Montague Grammar*, where for Russian there is not only syntactic and semantic differences but also clear morphological difference because Russian has a distinction between two classes of endings for adjectives, the so-called long form adjectives and short form adjectives. In prenominal position, I think, one always gets long form adjectives and in predicate position, they can be either. I don't want to go over other details of the case but ended it up showing, in the case of Russian, the semantic evidence, the syntactic evidence, and the morphological evidence all converge in saying that there should be these two distinct categories of adjectives. And from talking with Lee Kiyong about Korean a little bit, it sounds like there may be some similar distinction that's quite noticeable in two classes of adjectives in Korean. And that would be a nice thing to do research on I should mention that there is a lot more that seems to be involved in subclassification to the adjectives than just this distinction. In French, there are prenominal and postnominal position of adjectives and in some cases, that seems to correspond to this distinction. But, they also may sometimes be using it to distinguish things like restrictive versus non-restrictive, which is a completely separate distinction from this one. Although it would be very nice to start looking at every difference in the syntax of adjectives as, maybe, a reflection of semantic difference, not everything about adjectives by any means is explained by this distinction.

◇Chungmin Lee: How about having a break before we proceed further?

◇Bach: This will be very short. I can't refrain from adding to your references to Parsons, Kamp and Montague the following example, which is not exactly the same but closely related, from Ancient Greek philosophers, namely the Stoics who liked to play around the invalid inference forms. One of their examples was the following: That is my dog. That dog is a father. Therefore, that is my father.

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◇Partee: I think I have been talking so long that we're in danger of not having enough time left for all of the things that were supposed to be on this program. It has been suggested that I do try to say a little about each of the examples on the handout. But I think perhaps it would be better if we don't have questions. I love the questions, but if we go on with so many questions, then I think we will be here all night. If there is a time for questions at the end, that would certainly be fine. Let me just try to say a little about each of these examples to get the main ideas of them across. So I talked about adjectives and relative clauses where the conclusion, which can be incorporated in either Montague grammar or transformational grammar, is that some adjectives should be generated directly in combination with the noun that they modify. The arguments for

that come from the two constraints: the Well-Formedness Constraint gives purely syntactic argument for that conclusion and the compositionality constraint gives semantic argument for the same conclusion. This is a case where syntax and semantics go very nicely together if the syntax includes the Well-Formedness Constraint.

The next case that I want to talk about is the traditional rule of Equi noun phrase deletion from transformational grammar. In early transformational grammar and in much of current transformational grammar, it is assumed that all of the complex constructions of the language come from the embedding of sentences. Almost all of the recursion, or nesting of complex structures in transformational grammar has been assumed to involve full sentences. For certain kinds of complement constructions like the contrast between 'John wanted Mary to win' and 'John wanted to win', it was suggested that there was a rule of Equi noun phrase deletion that would delete the subject of the complement sentence when that's identical to the subject of the main sentence. For a sentence like 'John tried to win', we never have a sentence that has an explicit subject in the complement part, that is, if you look at (7) or 'John tried Mary to win', those are completely impossible.

(7) \*John tried for Mary to win

There is never any possibility of an explicit subject appearing in the complement sentence. The early response to that within transformational grammar was to say that for certain verbs like 'try', the rule of Equi-NP deletion was obligatory. Not only the rule is obligatory but something has to be said to say it is obligatory that the structural description of the rule must be met. Although the phrase structure rules would generate something like 'John tried for Mary to win', there must be a kind of filter again or something that will block the possibility of such a sentence ever reaching the surface as a well-formed sentence. Semantically, there is no good reason to think of verbs like 'try' as taking a full sentence as their complement. We can think of 'try' as something that combines with a verb phrase that expresses an action and makes a verb phrase that expresses another kind of action. 'Trying to win' does not include the action of winning, but just to speak in formal meaning of something like 'try to win' is a certain kind of relation to the meaning of the verb 'to win' as you could say to act in such a way as to bring about the action expressed by the complement verb phrase. Semantically, that makes good sense to think of 'try' as applying to verb phrase meanings rather than sentence meanings, and syntactically, if we want to maintain the well-formedness constraint that suggests that the verbs like 'try' should directly combine with verb phrases rather than combining with sentences. In Montague grammar, the term IV is often used for verb phrase. You can think that just the same as VP. When I wrote on the handout  $\bar{IV}$ , just mean that as the infinitive form, to+VP. To talk about 'try' in Montague grammar terms, we can classify it as something that takes an infinitive verb phrase to make a verb phrases, and semantically it makes better sense to think of 'try' as combining with verb phrase meaning than to think of it as combining with the complete proposition, and syntactically as well if we have the

Well-Formedness Constraint in our grammar, we will come to the same conclusion that we should combine 'try' directly with a verb phrase and not with a sentence. This suggests a kind of subclassification of different kinds of verbs that take complements. Some like 'want' really do take things that are like whole sentences, and as far as I can see a rule like Equi-NP deletion would be perfectly appropriate for a verb like 'want'. But other verbs like 'try' should be regarded as directly combining with verb phrases to make verb phrases. I can't go into all of the arguments about why the semantics is better with this structure, but the Well-Formedness Constraint gives sufficient reason to want to do the syntax in such a way. There is no Equi-NP deletion with verbs like 'try'. That's all I want to say about that example.

◇The next case is Tough-movement in English. This was one of the earliest and most famous kinds of transformations. 'John is easy to please' as an example sentence is almost like the banner of transformational grammar. I think there have been poems written called 'John is easy to please' and there is a book written called 'John is easy to please'.

◇Chungmin Lee: You wrote an article on it.

◇Partee: I wrote an article on 'John is easy to please' handled in Montague grammar. It is indeed a very nice example because of contrast with the other adjectives like 'eager'. I mean Chomsky's primary example of a difference between sentences that look alike on the surface structure having very different deep structures and very different semantic interpretations. Now that earliest transformational treatment of 'John is easy to please' was involved rules that are perfectly compatible with Montague grammar. We could import the transformations that were used in Chomsky's earliest work into Montague grammar as just like the rules I was illustrating earlier with the extraposition. These will be rules that make a syntactic change that apply to a single sentence that give you a new sentence, and the semantics of a new sentence is just the same as the semantics of the original sentence. In that earliest work, the underlying structure was taken to be something roughly like 'to please John is easy'. Actually in the very earliest work that would be a whole sentence in subject position. But if we mend that to just take an infinitive phrase in subject position, we start with 'to please John is easy' as the basic structure that means semantically 'easy' is really a predicate that describes actions or describes kinds of things that can be done. There are common nouns that have that same sort of semantic type like 'job': 'This job is easy', 'This job is difficult', 'This task is easy', or 'This task is difficult'. If you think about a kind of semantic category of actions or things like tasks, the infinitive phrase 'to please John' describes that kind of a thing and 'easy' in its basic function is really a modifier that modifies such things. And then the extraposition transformation which moves the infinitive phrase 'to please John' to the end of the sentence and leaves the dummy subject 'it' in subject position. That can be described as a rule that applies to any sentence that has an infinitive subject and that rule does not change the meaning as far as I am aware and it

may change it stylistically in certain ways, but in terms of the semantic content, it doesn't change it at all. The other rule which is defined only for the adjectives of the category of 'easy', the semantic and syntactic category that 'easy' belongs to, that rule can take some object noun phrase out of that infinitive, so takes 'John' out of 'to please John' and moves it into subject position replacing the dummy 'it'. The final surface form is 'John is easy to please'. Semantically, this derivation is perfectly natural because the meaning of each sentence is the same. Syntactically, it is natural because each stage is a well-formed sentence of English. A child might not necessarily learn the first one first, but it will be easy for a child to learn such a set of transformational relations since all of those sentences ones that he might hear in the ordinary English. So the classical transformational treatment of 'easy' is quite compatible with Montague grammar. Just as a footnote, I should mention there are certain problems when quantified noun phrases like 'everyman' or 'no man' are used instead of 'John'. But there is a way of making a natural restriction on which noun phrase the rule can apply to. But I think we'll make it perfectly easy to handle those cases. In 1974, Lasnik and Fiengo wrote an article in which they argued that instead of a movement rule there should be a deletion rule, a kind of Equi-NP deletion rule. Just in case you are wondering why anyone should ever has been unhappy with the classical analysis at all, one of the kinds of facts that they were concerned with, is that you can say things like 'John is being difficult to please'. This means John is acting in a certain way. He is acting in a certain way, that is, whatever you try to do for him he still stays unhappy or something.

That is a perfectly grammatical sentence but on the classical transformational treatment, the underlying structure should be something like 'to please John is being difficult' and that is completely ungrammatical in English. The progressive is possible in the 'John is easy to please' form but it's impossible in the 'to please John is easy' form. What Lasnik and Fiengo wanted to do was to give 'John is easy to please' a deep structure in which 'John' is the surface subject or the deep structure subject as well as being the deep structure object of the verb 'please'. They wanted to make 'John' the subject. So to be able to explain the fact that the progressive somehow depends on being an animate subject in this case. But they wanted to make it also the deep structure object to capture the well-known relation that 'John' is understood as the object of 'please' in these cases. That derivation clearly violates the Well-Formedness Constraint. 'John is easy to please John' is a completely garbage if anything is even worse than this one. It is clear that they were not working with anything like the Well-Formedness Constraint or they would not be trying to explain the ungrammaticality of this one, but positing something like that one which is at least bad or possibly worse. I don't want to try to explain here how to save what is right about the original analysis and at the same time explain this progressive.

That's what my paper about 'John is easy to please' in Montague grammar is

largely about and it has to do with saying there is really a different 'be' here. That means something like 'act', when you say 'John is being a fool', 'John is being noisy'. That is an active verb. That is not the ordinary copula verb, empty verb 'be'. In the ones which have infinitive subject, you can only get the plain copula 'be' and I have an analysis in the other paper that shows how, by going through to some other intermediate steps, you can introduce the other active verb 'be' in the case of the animate subject. But all I mean to illustrate here is that when you run into a problem in the theory like this problem, if you have the Well-Formedness Constraint, it very severely limits the kinds of solutions that you can try. I mean it really, whether it is right or wrong at least is clear that it cuts down very heavily on the class of possible grammars. We would make Lasnik and Fiengo's solution completely impossible. It would also rule out an analysis recently proposed by Chomsky in his paper 'On Wh-movement', which is in Akmajian, Culicover and Wasow, *Formal Syntax* volume, where he reanalyzed a great many transformations as being instances of Wh-movement and has an intermediate stage 'John is easy whom to please' and then a rule of obligatory deletion of that Wh-word after 'easy'. That would also be ruled out by the Well-Formedness Constraint because we never get Wh-words in these constructions.

◇Question: (Garbled.)

◇Partee: That's a different rule. There is a different construction that involves adjective complements with subject position like 'John was very nice to help us'. Is that the kind you mean?

◇Question: (Garbled.)

◇Partee: I am not sure about my intuitions are about that particular sentence 'John is splendid to please'. I think I could interpret 'John' as either the subject or the object in that case, or this may be genuinely ambiguous. I can certainly say something like 'John is splendid to dance with', where he is the object of 'with'

◇Question: (Garbled.)

◇Partee: I can't answer all those questions because I think there are many different adjective complement constructions and the 'easy' class is a fairly well defined class with fairly clear possibilities and ones like 'splendid', 'nice', and 'slow' are certainly different from 'easy'. What I don't know is how many different subcases there are and there are some kinds of cases which, so far as I know, still have nothing given any good analysis.

I'll tell you one of the hardest cases, if you want something to work on. The same student I mentioned before, Muffy Siegel, who worked on adjectives, worked on this case for a while and finally gave up because these were impossible. You cannot say 'John is rich to live in such a big house'. That is not well-formed. But you can say 'John must be rich to live in such a big house'. So it looks as though it has something to do with the 'must' and yet it also seems as though it makes a difference what kind of adjective you have. You can't just take any of sentences with 'must' and put this kind

of complement at the end. 'John must be rich to live in such a big house', it means I look at what a big house he lives in and from that I deduce that he is rich. It's a kind of like an epistemic statement that says my evidence for asserting that he is rich, is the fact that he lives in such a big house. There is some funny combination of the adjective and the modal and it seems syntactically very difficult to make the occurrence of complement depend on a combination of an adjective and a particular modal and it also seems semantically very difficult to find any treatment of this case that obeys the compositionality constraint, and try to say which part is put together, which part first. That just to say 'Yes, there are many problems about adjectives and their complements'.

◇In-Seok Yang: How about with 'enough' like 'rich enough'?

◇Partee: Yes. In the case of all kinds of modifiers like 'too rich' and 'rich enough', I think you can show clearly that the complement goes with 'too' or with 'enough'. 'Enough to live in such a big house' goes together to make a complex degree modifier which modifies 'rich'.

◇Kee-dong Lee: What about saying, 'John is crazy to live in such a big house'?

◇Partee: 'John is crazy to live in such a big house', that seems to be fine. The 'crazy' can take such complements by itself.

◇Kee-dong Lee: In that case, what is involved seems to be the speaker's evaluation or judgement, not necessarily pejorative.

◇Partee: 'Crazy' by itself does what the combination of 'must' and 'rich' does. Yes, 'rich' is not pejorative.

◇Bach: There is a complication here because 'John is crazy to live in such a big house' has an interpretation, that is closely parallel to 'It is crazy of John to live in such a big house'. That is evaluating the John's property of living in a rich house. I think that is crazy and I'm not sure whether that sentence has the interpretation quite like one Barbara is talking about. It might just shed some darkness on the problem. Another kind of modification you can introduce is to use a word like 'certainly' or 'probably' and say things like 'John is probably rich to live in such a big house' or 'Probably, John is rich to live in such a big house', which I think is all right.

◇Partee: No. I don't get that.

◇Bach: No? I can. How about 'Certainly rich to live in such a house'?

◇Partee: Yes, that one is all right. One difference in those examples is you can say 'to live in such a big house is crazy', but you cannot say 'to live in such a big house is rich'. 'Rich' can't be modifying them. But I didn't mean to introduce such a big can of worms at this point. But I think this little digression convinces us there's still plenty that needs to be worked out, and that's always nice in any discussion of what has been solved, you always like to know there's still more to do. It would be terrible if we ever finished all the problems. Then we'll be out of work.

In Montague grammar for treating 'easy' and just that category of adjectives and

that construction, we can either do it as in the classical transformational grammar with certain modifications and that was the approach I worked on in a paper of mine on 'easy' or it is possible to have three separate lexical items 'easy' corresponding to the three separate constructions illustrated by the three stages in the transformational derivation and one can generate each of those sentences directly by what basically like transformational rules and then the relation among them. The fact that they end up synonymous can be captured on the semantic side by writing what are called meaning postulates. They connect the meanings of 'easy<sub>1</sub>', 'easy<sub>2</sub>', and 'easy<sub>3</sub>'. Again I can't try to do that in detail because it requires a lot of logical notation. But it is worth pointing out that many relations which have to be captured in syntax in transformational grammar simply because there was no explicit semantics, can now be captured in the semantics and syntax, if we want, can be made much more nearly like a context-free grammar. We could have, for instance, corresponding to 'It is easy to please John', that would involve an 'easy<sub>2</sub>', which combines with an infinitive phrase on its right and the dummy subject 'it' on its left. I won't do that in detail. It is easy enough to build in restrictions of that sort and the meaning relation between the different forms of 'easy' can be stated semantically. But in either case, what is ruled out on this approach is a derivation which has underlying forms or intermediate forms which are absolutely ungrammatical and use a certain obligatorily triggered rules to turn those into grammatical forms.

Fifth example, I'll just mention very briefly. One of the earliest test to make syntax and semantics more closely related was the generative semantics program that was introduced by Lakoff, Ross, McCawley and others. Since they were working with a rather simplified notion of logic among the different kinds of logic that logicians have invented. They state pretty close to the most simple sort, what is called first-order predicate logic. They were trying to reduce the numbers of categories of language to a very small number, perhaps just noun phrases, sentences and predicates, or something; sentences, predicates and arguments. And they suggested among other things that quantifiers like 'many', 'three', 'four', 'all', or 'some' should be treated as a kind of predicate. In the case of 'many women arrived', they wanted to derive that from 'the women who arrived were many'. Now it happens that is well-formed in English although it is quite archaic. It is not a common use of 'many', but it is a possible use of 'many'. But what that committed them to was many cases where the underlying source was completely ill-formed as in trying to derive (7) from (8) or 'The men who left were every'.

(7) Every man left.

(8) \*The man who left was every (Lakoff)

There is absolutely no possibility and never has been in any historical stage of English as far as I know. There is no possibility of using 'every' as if it were a kind of predicate.

That suggests that the attempt to reduce the number of categories to some very

small number might be regarded as a bad idea because it forces more abstractness, more ill-formed underlying sources, more cases of violation of the well-formedness constraint, and longer derivations from ill-formed sources involving many obligatory steps. And as I mentioned before that kind of thing, it seems to me, could make it very difficult for a child to ever figure out from the surface forms he hears what the underlying forms were. Unless, perhaps a great deal of it happens to be specified by universal grammar, but no one ever showed a theory which explicitly would provide that. So in Montague grammar, quantifiers are treated as quantifiers and not treated as some other category, where those can be looked at as a category of thing which both syntactically and semantically combine with common noun phrases to make term phrases. Term phrases in the Montague grammar is the same basically as noun phrase in the transformational grammar. You can translate that into things which take Noms, the common noun phrases to make full NPs. And again I won't try to go into the semantics in any detail. Part of the reason that I'm not giving the semantics in detail is that it is impossible to do without quite a long preliminary introduction to the relevant logic. But if you will take it on faith both syntactically and semantically it is much preferable to treat the quantifiers as a special kind of category, that is combining with common nouns which semantically are just like simple predicates to make term phrases which semantically are a very different category.

Let me add as on the side. One of the big challenges for this kind of semantic theory comes from all those languages in which there is not a sharp distinction between common noun and noun phrase in all these languages of the world and there are very many of them where determiners are optional and where most commonly a noun by itself can function as a noun phrase. This raises an interesting problem because if we treat those languages the way we treat English and insist that common noun and term phrase are separate categories, then we seem to have to have some kind of zero elements for the quantifiers or determiners in such cases. Zero elements that are like the English 'a' or 'the' and perhaps two of them, I mean, if some language uses a bare noun and I think Korean can do this, to be ambiguous between 'a boy' and 'the boy', and 'the boys' and 'some boys' also. Maybe we need something like four different zero quantifiers to correspond to the English quantifiers and that also goes against the spirit of Well-Formedness Constraint since the zero quantifiers are not real sayings that occur on the surface in the language. So the real challenge is to ask whether it is possible to formulate a logic with quite a different basis. A logic that does not require a sharp distinction between term phrase and common noun phrase, in which the languages which don't use obligatory articles can be described in a way that matches their surface structure without bring in these abstract empty determiners to do the job. Some beginnings of attempts to think along those lines have been made but no one has so far been able to devise a new logic with that kind of property.

The last one involves an illustration of another recent proposal which would not

even be a possible analysis of the Well-Formedness Constraint is correct. As some of you may be aware, there has been an argument in recent transformational grammar. The argument has been carried on, in large part, between Chomsky on one hand and everybody else on the other hand. I think it shows up in the Akmajian, Culicover, and Wasow volume, *Formal Syntax*, with both Chomsky's paper and Bresnan's paper and the comments on them. They address it where classical transformational grammar analyse things like the formation of Wh questions, as applying to the Wh-word or something that underlies the Wh-word anywhere in the sentence, no matter how far down embedded and moving it in one rule, up to the beginning of the sentence.

Chomsky has been arguing in these most recent papers that it doesn't move all the way to the beginning of the sentence in one rule because he wants to limit rules to always applying just to a sentence and sentence immediately below it. What he has been suggesting is if you have a structure with several sentences embedded within one another that the Wh-word first moves up to the beginning of its own sentence, then moves from there to the beginning of the next sentence and finally moves from there to the beginning of the whole sentence. So this moves into the position called complementizer position on his theory. This is the Comp-to-Comp hopping analysis as opposed to the swooping analysis. It is clear that if you believe in the Well-Formedness Condition or if you believe in the compositionality constraint from either the syntactic or the semantic side. That is really not a reasonable kind of analysis. Syntactically it produces many ill-formed intermediate structures if you look at (9), (10), (11), and (12).

- (9) (Chomsky, 1977) John claimed that Mary wished that Sam would kill who
- (10) \*John claimed that Mary wished who Sam would kill (t)
- (11) \*John claimed who Mary wished that Sam would kill (t)
- (12) Who did John claim that Mary wished that Sam would kill (t)?

(12) is the sentence for trying to derive. That little *t* at the end is Chomsk's trace from his trace theory. But you can ignore that if you want. That is a good question: 'Who did John claim that Mary wished that Sam would kill?' The underlying structure would be something like (9), if you have 'who' in deep structure or something that turns into 'who'. Any way, that's the position where the question word is originating. But if we take the old analysis we go straight from (9) to (12), directly deriving (12). (9), by the way, is well-formed as an echo-question. We can have questions in English where we leave the Wh-word behind, although they usually have a special kind of interpretation. 'John claimed that Mary wished that Sam would kill who?' it's something that is used if I didn't hear you correctly. It is not an ordinary information question. But it at least on that basis can be argued that it is a well-formed possible kind of structure. But those intermediate stages which come if you try to this Comp-to-Comp analysis are completely ill-formed because neither 'claim' nor 'wish' allows 'who' complements as possible embedded

sentences. (10) is impossible and (11) is impossible. The Comp-to-Comp analysis clearly violates the Well-Formedness Constraint. It also violates the semantic compositionality in the sense there is no way to make any sense of the interpretation that you get when you have something like 'wish' and then a who-clause after it, whether you try to treat it as an indirect question or as a relative clause or as a free relative, any of the kinds of semantic interpretations that can be given to who clauses. None of those combine, in any sensible way, with the verb like 'claim' or the verb like 'wish'. Either within Chomsky's own theory where he talks about interpreting the 'who' as something like 'for which X ... X' at the original position, even within his own theory the way were he'll end up with Xs, free variable Xs, bound variable Xs rather, in all these complement positions as well, and those also make no sense semantically and he has said himself that he has to somehow make those invisible during the semantic interpretation from the derived structure.

I think I'll skip the issue about how Montague grammar does question. There have been some recent articles by Karttunen and others that give a very elegant treatment, elegant both syntactically and semantically. For questions in Montague grammar, and say just they do all involve either a movement rule of some sort that is the swooping kind like in transformational grammar or they involve starting out with something like a free variable in this position and generating Wh-word directly in initial position and then there is a long distance interpretation rule that is like the long distance movement rule. But in either case, the kinds of analysis that are done within Montague grammar are much closer to the old original Wh-movement. Then they are to this new Comp-to-Comp movement. Even forgetting Montague Grammar I would suggest if we adopt in transformational grammar something like the Well-Formedness Constraint, we could rule out a lot of crazy analyses of a sort which otherwise are in danger of proliferating all over the place. If the Well-Formedness Constraint is looked at within Montague grammar, I can state an even more positive kind of result and that is that the analyses which are syntactically preferred according to the Well-Formedness Constraint also are seen in every case that has been examined so far to those analyses which also make the best semantic sense with Montague's original compositionality constraint. That suggests Montague grammar and the kind of way of looking at how the grammar works can make a contribution to syntax that extends to transformational grammar as well as the contribution that has already made to semantics and that it can reinforce the idea that form and meaning in ordinary language are really very closely connected, and that the search for constraints on the form of the grammar is one of the best ways to discover those sorts of connections.

◇Chungmin Lee: (Recapitulation.) Do you have any further questions or comments?

◇Ik-Hwan Lee: In Korean, I think, we have two particles comparable to the English 'even'. One combines with negation, and the other with quantity, with quantification rules. The particle is comparable to English 'even'. That is a sort of ad

hoc constraint but I couldn't think about the way. One particle is 'kkachi' and the other is '-machə'.

I postulate 'kkachi' as a sort of positive counterpart of 'even', '-machə' as a sort of negative counterpart of 'even'. When I introduce '-machə' particle together with noun phrases. I need some sort of quantification rule to recognize the sentential negation already applied. We do sententially negate an open sentence that comes in. If the quantification rule comes first, then there is no way to constrain the negation rule so that it can apply only to the negative counterpart of English 'even'.

◇Kiyong Lee: If we introduce the Well-Formedness Constraint in Montague grammar then either this analysis is wrong or, as he might claim, your Well-Formedness Constraint is too strong.

◇Partee: This may be a difficult question. But let me ask if you have any intuition that'll make it clear if that's syntactically bad or rather semantically bad.

◇Chungmin Lee: Syntactically bad.

◇Ik-Hwan Lee: Syntactically well-formed.

◇Bach: Can I ask a factual question about Korean? Is 'pi-ka o-n-ta' O.K.? Is that a regular way of saying it is raining? (O.K.) So the problem is in having a set of abstract 'hata' and 'ki', etc. as in \*'pi-ka o-ki ha-n-ta' as opposed to 'pi-ka o-ci ani ha-n-ta'.

◇Ik-Hwan Lee: 'pi-ka o-ki-nin ha-n-ta' is all right'.

◇Chungmin Lee: With the conditional, contrastive marker 'nin' attached to the nominalizer 'ki'.

◇Partee; Whereas in English we would hardly ever say something like 'As for rain coming, it does', We might say something like 'As for rain coming, it hardly ever does', when we wanted. So when you add some extra information to make it not redundant, it's well-formed. It's almost impossible to make those complex forms count as well-formed, without also making the simpler redundant ones count as well-formed. I remember in some of Chomsky's earliest examples, he used to use the simplest sorts of sentences to illustrate English grammar like 'Birds eat'. It's probably true that no one ever says it, but perhaps because it's so nearly a tautology.

Just judging from disagreement that I see here, I think this illustrates the fact that you can never put all of the work on any one constraint. I mean if you run into cases like this where it's not clear which way the Well-Formedness Condition forces in, then that adds to the reason for trying to get evidence from these many different sources as possible, I mean, to really try to decide between these analyses. I would want to see what kind of semantic rules are associated with each analysis. Perhaps one of them is more straightforward than the other in terms how to get the meaning of the resulting expression from the meanings of its parts. I will also want to look at evidence from children's acquisition of the language, evidence from things like how people parse sentences, perhaps evidence from historical change although that must have to be used

with caution and in general no single constraint is ever going to resolve all of the cases no matter how tight you make the constraint.

◇Ik-Hwan Lee: In talking about quantifiers, like ‘many’ and ‘every’, did you say that ‘many’ and ‘every’ should be categorized as one kind of quantifiers?

◇Partee: I should have added that ‘many’ in the sort of archaic dialects which allow sentences like (17) ‘Women who arrived were many’. That suggests ‘many’ has another categorization in addition which is something like a predicate on sets or something like that.

◇Ik-Hwan Lee: That’s the point. In Korean, we have a perfect sentence comparable to (17). So it might be a little difficult to lump ‘many’, ‘the’, ‘a’ and ‘all’ into one, and I see some difficulty even in translating the item of ‘many’.

◇Partee: Among the quantifiers, there really are several logically distinct types. In ‘many’ along with those numbers like ‘three’ and ‘four’, those are quantifiers which describe that cardinality of some set. But things like ‘every’ and ‘each’ and also things like ‘most’, for instance, they don’t describe the size of the set. They rather say something about what proportion of the set—the whole set, a half of the set, some part of the set. A more complete analysis would not really lump all of quantifier type of words into a single semantic category. We’d really make further distinctions between them. That corresponds with the fact that, for instance, in English you can have both ‘Many of the women arrived’ or ‘The many women arrived’ like ‘Three of the women arrived’, ‘The three women arrived’, and they have different meanings: in one case, it’s something like a proportion of the set and, in the other, it’s talking about the size of the set. With ‘every’ you only have something like ‘Every one of the women arrived’, and nothing like ‘The every woman arrived’. That also correlates to the fact that ‘every’ has only the one kind of quantifier meaning and ‘many’ really can play two different roles. You’d need more subdivision and more complete grammar.

◇Chungmin Lee: In that subdivision, you can distinguish ‘every’ and ‘all’, right?

◇Partee: Yes. ‘Every’ and ‘all’ are also distinct semantically as well as syntactically. Syntactically, ‘all’ goes with plurals or mass nouns and ‘every’ always goes with the singular count noun and semantically, I think, ‘all’ has more to do with talking about something that applies to a whole set as a group whereas ‘every’ says something also about the whole set but more like one at a time. You can say ‘All the pieces of the puzzle fit together’, but you can’t say ‘Every piece of the puzzle fits together’, for instance.

◇In-Seok Yang: Is ‘the man who left was every’ semantically interpretable?

◇Partee: I think it’s not semantically interpretable. Perhaps if you made it plural, and said something like ‘the men who left were every’, you could force some kind of derivative semantic interpretation if you interpreted it as something like ‘the men who left were every one of the men’. If somebody said it, I could probably find some way

of relating it to a well-formed sentence which I could interpret. But I put it in the singular, since it's clearly one of the properties of 'every' that it occurs only with the singular, and when you tried to say 'the man who left' first by itself clearly has to pick out just one man and to try to say of that, one man that he was every, I think I find uninterpretable. I expect to find something universal of that sort because in order for anything to be used as in that simple predicate position, it ought to be expressing a property of something or other and things like 'many' can be expressing something like property that certain sets have, namely, something about the size of the set. But 'every' in any words that really means the English 'every', I cannot be interpreted as property of anything because it essentially has this function of picking out proportion of the set and not describing the set in anyway.

◇Kiyong Lee: Is your Well-Formedness Constraint compatible with the transformational theory when we understand one of the functions of transformation being filtering?

◇Partee: I think the way to make the Well-Formedness Constraint compatible with transformational grammar goes back to some earlier work done by Peters and Ritchie and, also I think, in a paper by Emmon sometime ago, where they describe something called local grammaticality constraint. It is basically a constraint that would say that the structure at the end of each transformational cycle should be a well-formed structure. For things like the relative clause cases that I was discussing before, where if you have a noun and that a relative clause that does not contain any identical noun phrase so there is no way to apply relative clause rule, then I think there is no way to avoid some filtering, something that in the strict form would be a violation of the Well-Formedness Constraint. So I think the closest analogue that you can get within transformational grammar would be something that says that when you apply the rules of each cycle on the way up the tree, the result at the end of every cycle must be, for anything that can result from any choice of rules supplying on a given cycle, well-formed sentences and I think that by itself we rule out all of the things that I talked about here, for instance, we would rule out Chomsky's Comp-to-Comp movement analysis because that produces things at the end of certain cycles that were ill-formed like 'Mary wished who Sam would kill' resulted at the end of one cycle. So I think you cannot have a constraint that's quite as strong as the version that you can have in Montague grammar. But you can have one that's almost as strong and that does, in fact, rule out many of the analyses including all of the analyses that I discussed here.

◇Bach: Could I just add a comment to that? Several years ago, I got interested in what the difference between what I call classical transformational grammar that is pre-*Aspects*, specially the version of that theory which is developed by Charles Fillmore in a paper called 'On the Position of the Embedding Transformations in a Grammar' and it turns out that I tried to argue that you can show that the classical theory was more constrained theory than any theory that was developed from the *Aspects* model. It was a

more constrained theory and one of the important respects in which it was more constrained was that grammars is written *Syntactic Structures*' Theory had to conform to something like this local grammaticality constraint, because you're always putting together separate sentences and embedding them, that means that any sentence that you embed has to underlie a possible grammatical sentence because it may not get embedded and you still want it to come out as a fine sentence. We rule out sorts of analyses that are possible within *Aspects* system which starts with this big deep structure where everything is embedded already. For example, you could not have a rule in a grammar like that uses  $\bar{S}$  as an initial symbol and says  $\bar{S}$  goes to Comp+S because we don't have full sentences in English like 'That John left'. That would be impossible in that kind of system.

◇Partee: Let me just add to Emmon's addition. For instance, the problem of the relative clause filtering does not arise in the *Syntactic Structures* model because you limit the relative clause rule in *Syntactic Structures*. It combines two sentences and it will combine them only if they have a noun phrase that is in common involved sentences. If they don't, then you simply won't embed the one sentence into the other. You won't generate anything that is like a relative clause construction with an impossible relative clause. It's true that the *Syntactic Structures* model would enable one to have something much more like the Well-Formedness Constraint in the strong form.

◇Bach: I also want to add just one brief comment that I think Barbara herself tried to show that the earliest version of transformational grammar was in many ways much more like Montague grammar than the later versions of transformational grammar.

◇Chungmin Lee: But the *Aspects* type of transformational grammar tries to incorporate the semantic component. That's why this is a little bit more abstract than the former classical transformational grammar.

◇Bach: But the first attempt to incorporate semantics, namely Katz and Fodor paper, in another way was more like Montague grammar because in Katz and Fodor there were two kinds of interpretation rules. One kind was exactly of the sort that Barbara was talking a little ago, when she was talking about a certain semantic rule being used in conjunction with a certain syntactic rule. These would be all  $P_2$  type rules and when the theory of *Aspects* came out those were dropped completely and the subsequent work of Katz used just first kind of rule and the second kind is much like that Montague approach to the relationship between syntax and semantics.

◇Partee: One of the most unfortunate historical accidents in the development of transformational grammar and the attempts to combine syntax and semantics was the Katz-Postal hypothesis. It was a really beautiful hypothesis and would have been so nice if it had been true that all of the semantic structure could be interpreted on the deep structure level. It was so nice that made everyone believe it and then do terrible things to the syntax to try to keep that hypothesis. The historical accident part of it was that in all of the examples that Katz and Postal considered when they were arguing that transformations

do not change meaning. All of the noun phrases in their examples are proper nouns. They never put quantified noun phrases into their examples. If they had considered quantified noun phrases, 'Everyman wants to win' clearly does not mean 'Everyman wants everyman to win', even though you might think 'John wants to win' means 'John wants John to win'. If only they had looked at quantified noun phrases then I think that they never would have suggested that Katz-Postal hypothesis and there never would have been so much attempt to try to get all of the semantic interpretation from the deep structure tree and that might have stayed much closer to the *Syntactic Structures* model and then there might have been much less argument between interpretive semanticists and generative semanticists. What both of them noticed was the quantifiers, and both of them made big changes in the theory to try to account for the sentences with quantifiers.

The generative semanticists liked the Katz-Postal hypothesis. When it didn't fit with the simple syntactic structure, they made this every ugly impossible syntactic structures like 'the man who left was every'. Interpretive semanticists liked the classical *Syntactic Structures* and went to a great length the great things to try to add on semantic rules at the base and the semantic rules at the end of the cycle and other semantic rules of the surface and did terrible things to the semantics. Because the *Aspects* model with the idea of deep structure semantic interpretation had gained so much attraction and had seemed so nice. I'm oversimplifying, of course. But all of that just because everybody used 'John and Mary' in all their examples and never used 'every man and some woman' and those kinds of noun phrases.

◇Chungmin Lee: Maybe they forgot predicate logic.

◇Dong-Whee Yang: In some cases intermediate ungrammatical structures are allowed. It's why Chomsky allows (10) and (11) to capture some generalization like a structure-preserving hypothesis. How would your model compensate for that structure-preserving hypothesis?

◇Partee: I don't see from this example in any way that Chomsky's analysis helps with the structure-preserving hypothesis. I think that analysis was because he wanted to keep the subjacency hypothesis and I think the subjacency hypothesis is simple wrong. So I don't want to keep that generalization.

So far most of the evidence has been in support of the Well-Formedness Constraint. There has been a problem for years and years about the analysis of the word 'any' in English and this is an example where it has been very difficult to distinguish syntactic ill-formedness from semantic well-formedness. If we have a sentence like 'Anyone left', for instance, in isolation that has generally been regarded as ill-formed. So we put the syntactic star by the sentence '\*Anyone left'. It may have something common with the problem about the negative particle for 'even' in Korean. 'Any' has to have some kind of negative environment. But to generate something like 'John doubts that anyone left' and many other examples, it looks as though we need something like 'anyone left'

as a part of this larger structure. It's not just a word negation like things with 'not', as in something like 'John is unhappy that anyone left'. When I first started working on the Well-Formedness Constraint, this class seemed to me a class of potential counterexamples because I could not imagine any way, syntactically or semantically, for generating the full class of constructions that include that subparts like 'anyone left' without generating something like 'anyone left' directly. In the early days, there were some attempts to derive this transformationally from something like 'someone left'. But I think those attempts also were shown to be impossible because of two kinds of reasons: one being that's impossible to syntactically characterize all of the environments where the change should take place and the other reason is that there is such a big class of items with similar restrictions like 'ever' and 'at all' modifiers and many of these do not have any positive counterpart. So it does not seem possible to derive all of the words of the negative polarity items from words with the positive items. When I first wrote a paper on the Well-Formedness Constraint, I listed among the possible counterexamples, the fact of the polarity items, because it seemed to me in this case it is necessary to derive some well-formed thing from part that had ill-formed sources. But now, in the meantime, there has been a recent dissertation from University of Texas by William Ladusaw, in which he has been able to give a semantic characterization of the content of their words and the kinds, all of these things like 'doubts that' and 'unhappy that' and verb negative as well. He gives a very clear kind of basis in the model-theoretic semantics that the non-linguistic part of the interpretation system which explains or which enables us to predict perfectly on semantic grounds which of the sentences end up with making sense and which ones don't and on the basis of his theory it is very reasonable to say this sentence as far as syntax goes. This should count as perfectly well-formed syntactically because we have a perfectly good explanation. Now, on semantic grounds, when it is used in isolation, it's not interpretable. Now, there is the new semantic explanation for the problem. Let's stop here. We may have to stay here all night.

◇Chungmin Lee: I hope today's workshop turned out fairly well-formed. Thank you very much.